

## **Draft CSM Outline – Radiological Contamination at Hunters Point**

Rad contamination at Hunters Point came from several sources:

- NRDL research and experimentation
- Use of sources for gamma radiography and check sources that leaked and were repaired
- Decontamination of Operation Cross-roads ships
- Use of radiological buttons, deck markers, and dials

NRDL research and experimentation resulted in contamination of buildings, storm drains and sanitary sewers, and spills to the surface (e.g., asphalt [peanut spill], concrete [vault for liquid rad waste tank], soil [707 triangle]).

An unknown amount of radiological contamination was washed down sinks and floor drains, resulting in contamination of floors, walls, sinks, drains, and piping. Some of this contamination ended up in the storm drains and sanitary sewers. For many years, Laurie Lowman stated that the most significant contamination in the storm drains and sanitary sewers would be found in the lines along Cochrane Street – due to elevated detections of Cs-137 in manhole sediment and knowledge about historical rad operations in the vicinity of Cochrane Street

Originally, there was a single combined sanitary sewer and storm drain system at HPS. There were at least three attempts to separate the storm drains and sanitary sewers (HRA pg 8-218) – in 1958, 1973, and 1976, but the job was never completed. Excavations to remove the sanitary sewers and storm drains confirmed that this job was not completed.

Devices for gamma radiography at HPS used Ra-226, Ir-192, Cs-137, and Co-60 (HRA page 6-8). Sources used to calibrate instruments used Cs-137, Co-60, Pu-239, and Th-232 in specially designed shield assemblies, that were checked for leakage and repaired if necessary (HR, page 6-10). Many of these sources were not licensed (HRA, pages 6-10 and 6-11).

According to the HRA (pages 6-5 through 6-7), use of radioluminescent devices at HPS began in the late 1930s and continued until at least 1971. Originally, most devices were painted with paint containing Ra-226. These devices allowed Navy personnel to locate controls, gauges and walkways when darkened operations were conducted on ships or at bases. Control over and disposal of these devices began in the late 1960s – prior to that both were uncontrolled. Starting in the 1950s, other radionuclides, including Sr-90 (deck markers) and H-3 and Pm-146 (diver's equipment) were also used. Prior to the late 1960s, used devices were commonly disposed by burial in landfills (or in the case of Hunters Point in the IR-02 Radium Dial Disposal Area). Liquid waste containing radium was commonly disposed via building drains to the sewers. It was common practice to leave rad devices "in place on equipment when it was sent to the salvage or scrap yard or processed through smelters" (e.g., which explains the devices found in the metal slag area and metal debris reef).

Rad devices have been found on the surface in many areas of Hunters Point (e.g., ship berths, Dry Docks, Gun Mole Pier, Parcel D-1, etc.), apparently due to the lack of requirements to control these devices. It is possible that rad devices were discarded to the surface in other areas. As a result, when soil was piled alongside excavations to repair or separate the storm drains and

sanitary sewers, rad devices could have been mixed into the soil and pushed into the excavations when they were backfilled. Devices could also have been washed down drains, discarded from ships at berths and in dry docks, etc.

Dredge material could have contained rad devices from the time when they were first used at HPS (late 1930s according to the HRS). During WW II, as ships were coming into dock, it was common to throw equipment overboard to avoid having to inventory it and to speed up turn-around time in port (e.g., MEC found when dredging is done in Mare Island Strait). This could have occurred for rad devices at HPS. This suggests that any areas filled with dredge (not just Parcel D-1 and areas after 1946) could have rad devices mixed in with the dredge spoils.

Due to pressure washing (last done in 1999) the storm drains, less radiologically contaminated sediment would have been found in the storm drains and associated manholes. However, when piping contained sediment, it often tested positive for Cs-137. In some areas, upgradient of rad-impacted buildings, this Cs-137 could have been due to run-off contaminated by radioactive fall-out. However, in areas like the southeastern corner of Parcel G where Cs-137 was used in animal experiments and spilled on the surface, Cs-137 contamination was due to NRDL use of this radionuclide. Sinks, floor drains, piping, walls, asphalt, and concrete vaults were found to be contaminated with Cs-137 in Parcel G. Buildings 364 and 365 had to be demolished because the rad contamination (much of it Cs-137) could not be remediated without compromising the structural integrity of these buildings.

Pressure washing may also have caused release of rad-contaminated sediment to the soil surrounding the storm drains, particularly in areas where the pipe was made of clay or terracotta. Much of this piping was so badly damaged that it could not be removed intact during the SD/SS TCRA (personal observation, statements made to Regulatory Agencies during field inspections of SD/SS TCRA).

Areas of Hunters Point that have been paved (e.g., Parcels B-1, B-2, C, D-1, and G) were first graded so that rainwater would flow away from buildings and toward drainage swales. This grading involved moving soil to lower some areas and to raise others. After soil grading and compaction, asphalt (aggregate) base course (ABC) was placed to a minimum depth of 4 inches. Then the site was paved, typically with GPS-guided equipment to ensure that the proper grade for stormwater control was maintained. As a result of the grading, soil was likely displaced. Therefore, because soil has been moved, scanning the surface is probably not meaningful unless the entire surface of a parcel is scanned after removal of the asphalt and ABC. The problem is that we don't know if or how much of soil that was formerly on the surface at a building site or above a trench unit has been moved or where it was moved.